

Buddha's Brain:

Strengthening the Neural Foundations of Mindfulness and Compassion

Leading Edge

October 21, 2013

Rick Hanson, Ph.D.

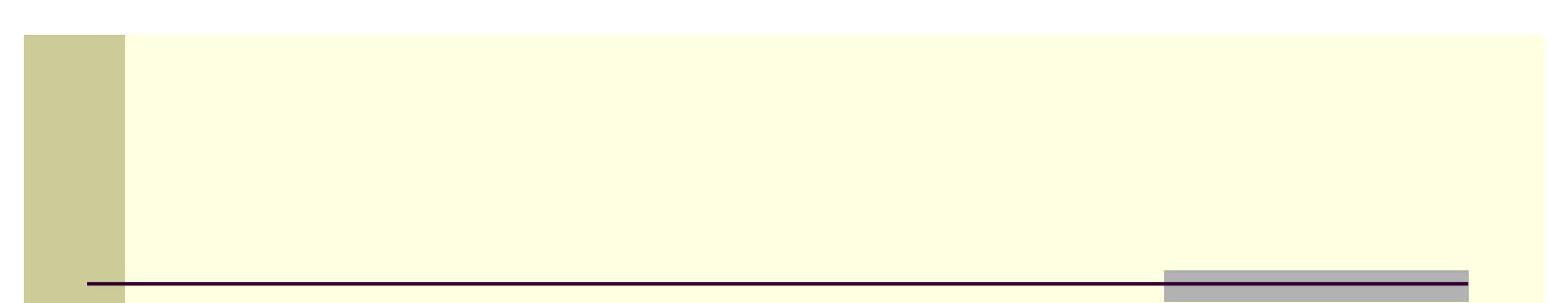
The Wellspring Institute for Neuroscience and Contemplative Wisdom

www.WiseBrain.org

www.RickHanson.net

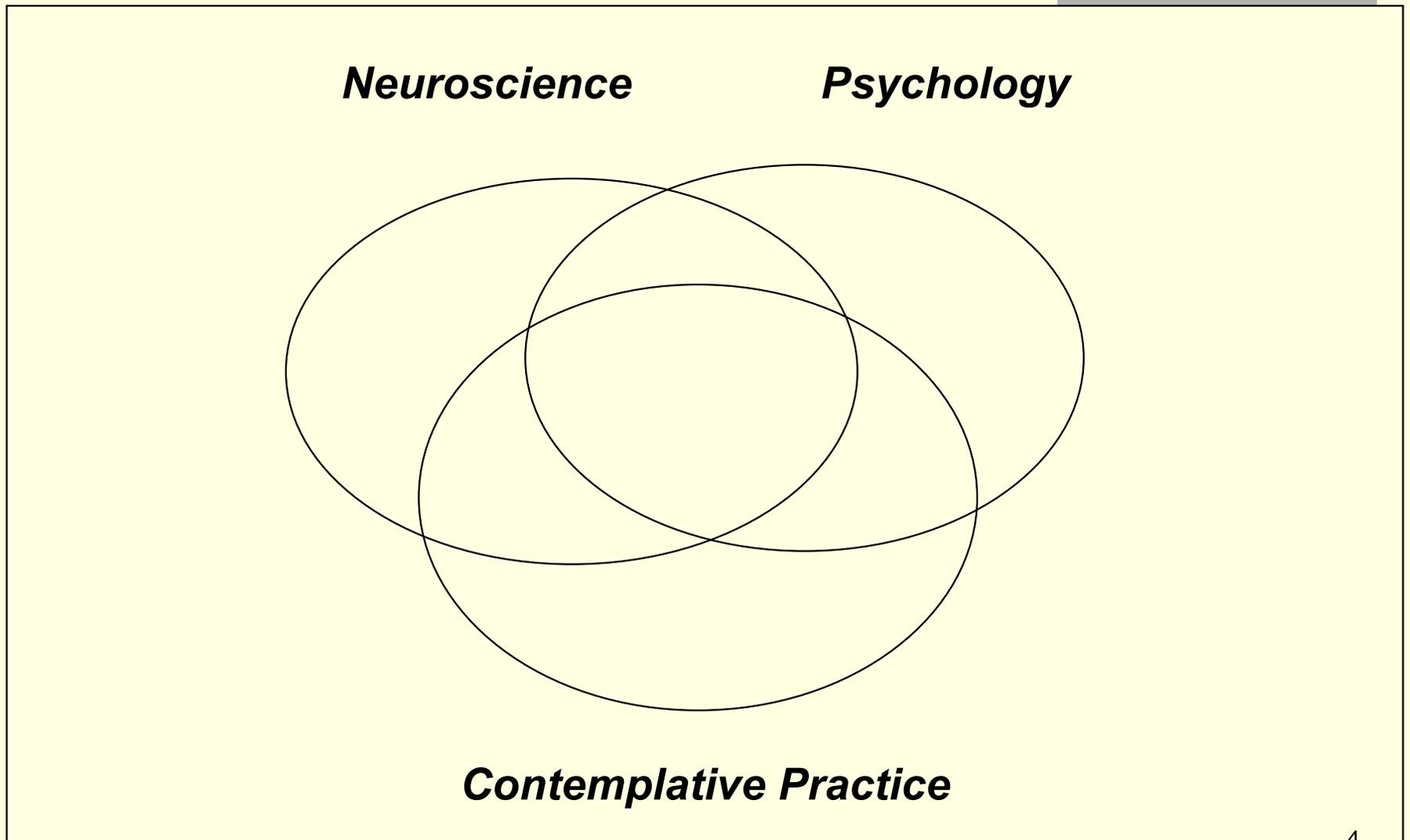
Topics

- **Grounding the mind in life**
- **Self-directed neuroplasticity**
- **The power of mindfulness**
- **Self-compassion**
- **Networks of spacious awareness**
- **Taking life less personally**



Grounding the Mind in Life

Common - and Fertile - Ground



The Natural Mind

Apart from the hypothetical influence of a transcendental X factor . . .

Awareness and unconsciousness, mindfulness and delusion, and happiness and suffering must be natural processes.

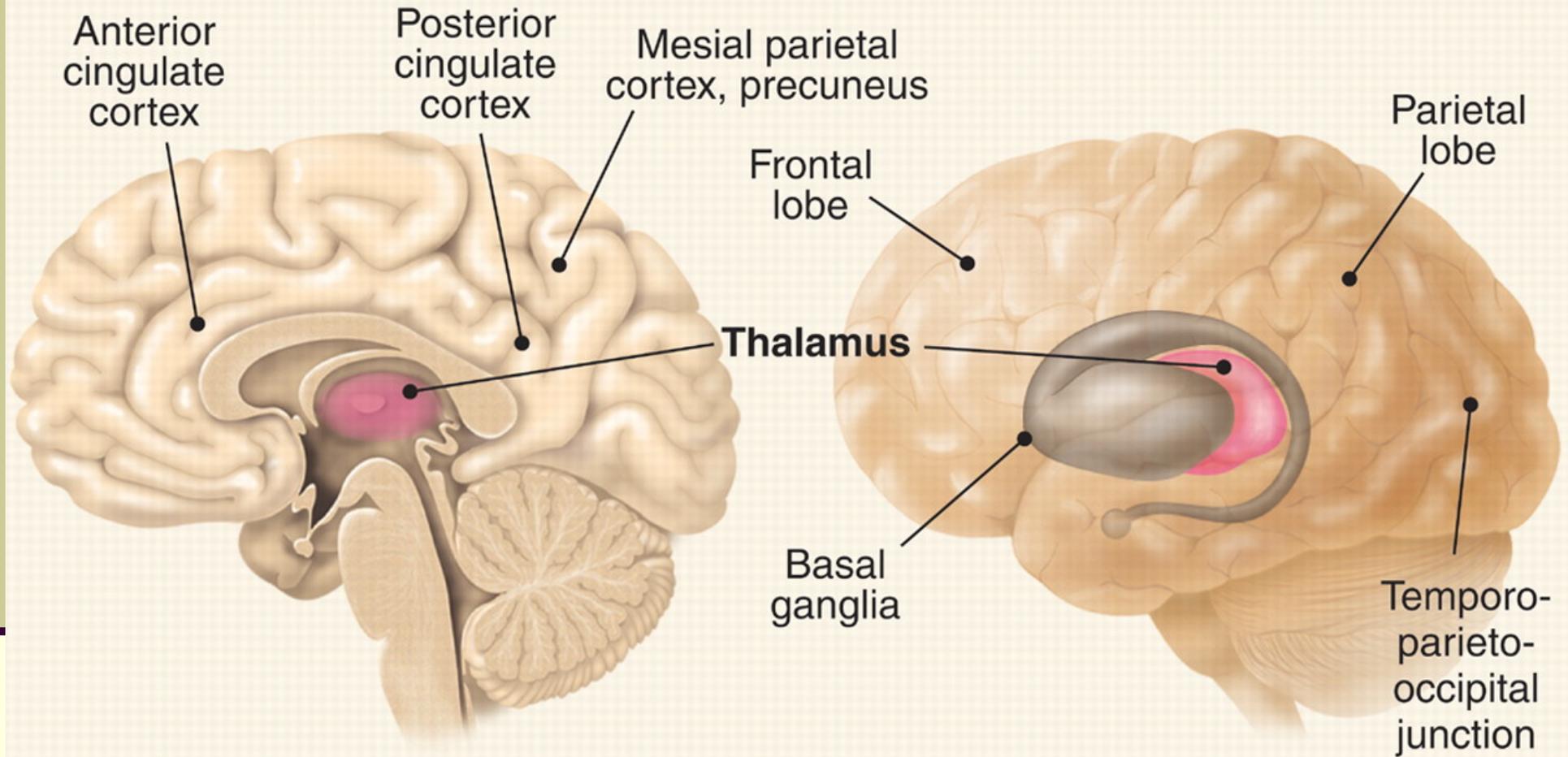
Mind is grounded in life.

All cells have specialized functions. Brain cells have particular ways of processing information and communicating with each other. Nerve cells form complete circuits that carry and transform information.

Electrical signaling represents the language of mind, the means whereby nerve cells, the building blocks of the brain, communicate with one another over great distances. Nerve cells generate electricity as a means of producing messages.

All animals have some form of mental life that reflects the architecture of their nervous system.

Key Brain Areas for Consciousness



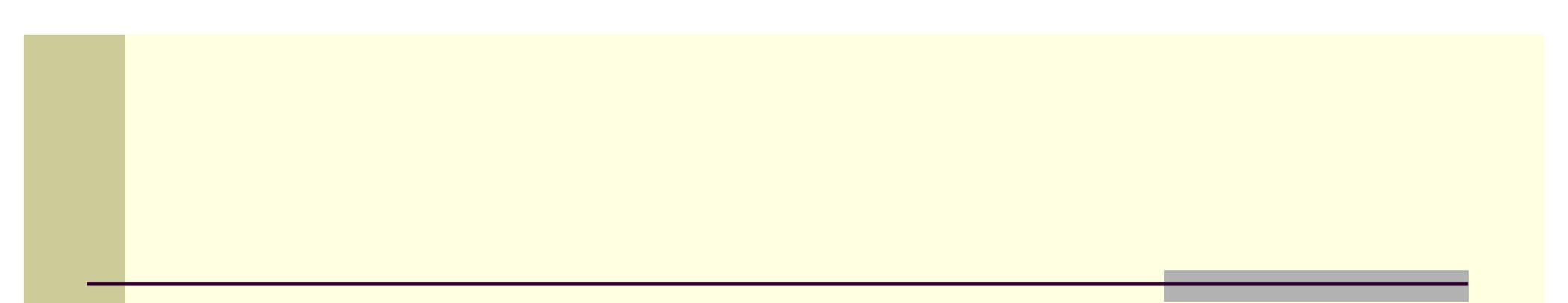
(adapted from) M. T. Alkire et al., *Science* 322, 876-880 (2008)

"We ask, 'What is a thought?'"

We don't know,

yet we are thinking continually."

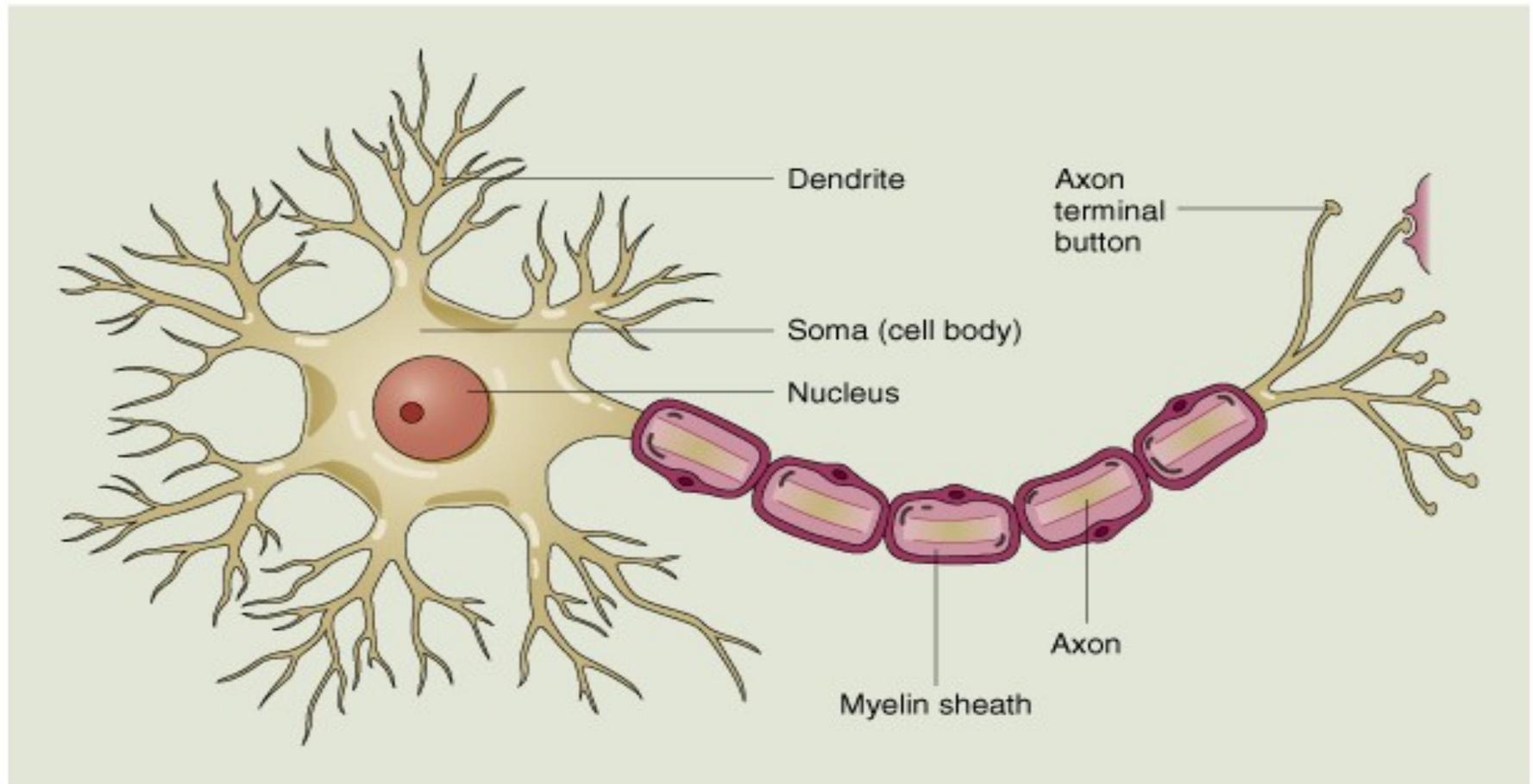
Venerable Ani Tenzin Palmo



Self-Directed Neuroplasticity



A Neuron



© 2000 John Wiley & Sons, Inc.

Your Brain: The Technical Specs

■ **Size:**

- 3 pounds of tofu-like tissue
- 1.1 trillion brain cells
- ~ 100 billion “gray matter” neurons

■ **Activity:**

- Always on 24/7/365 - Instant access to information on demand
- 20-25% of blood flow, oxygen, and glucose

■ **Speed:**

- Neurons firing around 5 to 50 times a second (or faster)
- Signals crossing your brain in a tenth of a second

■ **Connectivity:**

- Typical neuron makes ~ 5000 connections with other neurons:
~ 500 trillion synapses

Fact #1

As your brain changes, your mind changes.



Ways That Brain Can Change Mind

■ For better:

- A little caffeine: more alertness
- Thicker insula: more self-awareness, empathy
- More left prefrontal activation: more happiness

■ For worse:

- Intoxication; imbalances in neurotransmitters
- Concussion, stroke, tumor, Alzheimer's
- Cortisol-based shrinkage of hippocampus: less capacity for contextual memory

Fact #2

As your mind changes, your brain changes.

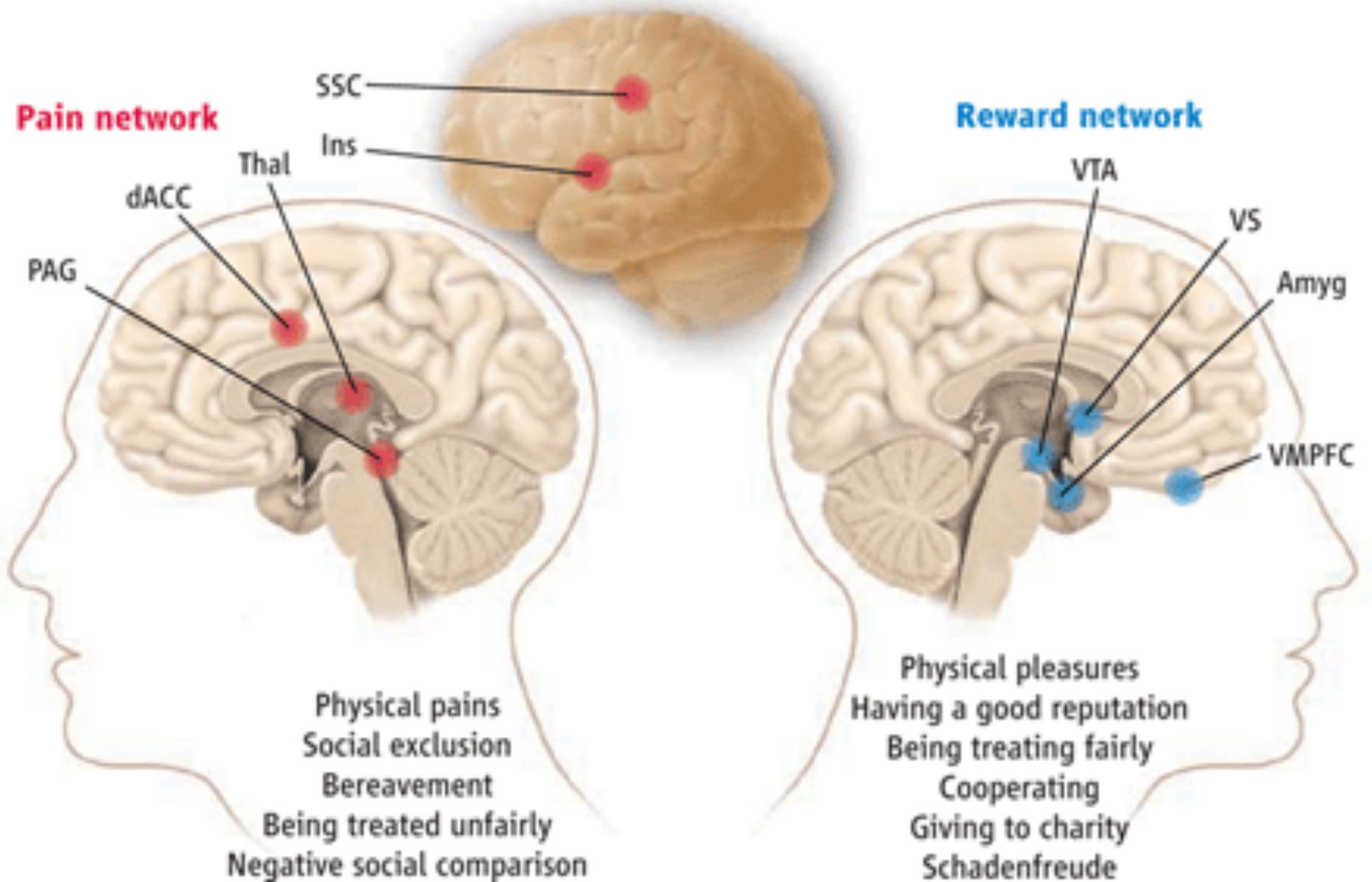
Immaterial mental activity maps to material neural activity.

This produces temporary changes in your brain and lasting ones.

Temporary changes include:

- Alterations in brainwaves (= changes in the firing patterns of synchronized neurons)
- Increased or decreased use of oxygen and glucose
- Ebbs and flows of neurochemicals

**Mental activity entails
underlying neural activity.**



Pain network: Dorsal anterior cingulate cortex (dACC), insula (Ins), somatosensory cortex (SSC), thalamus (Thal), and periaqueductal gray (PAG). Reward network: Ventral tegmental area (VTA), 17
ventral striatum (VS), ventromedial prefrontal cortex (VMPFC), and amygdala (Amyg). K. Sutliff, in
Lieberman & Eisenberger, 2009, *Science*, 323:890-891

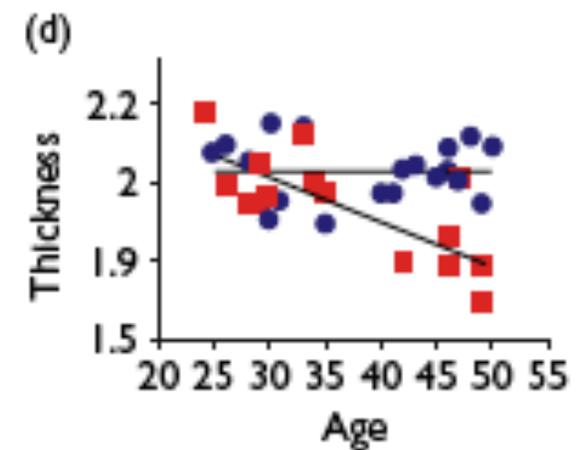
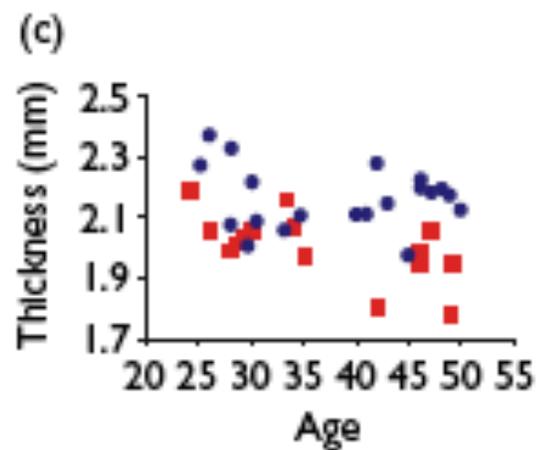
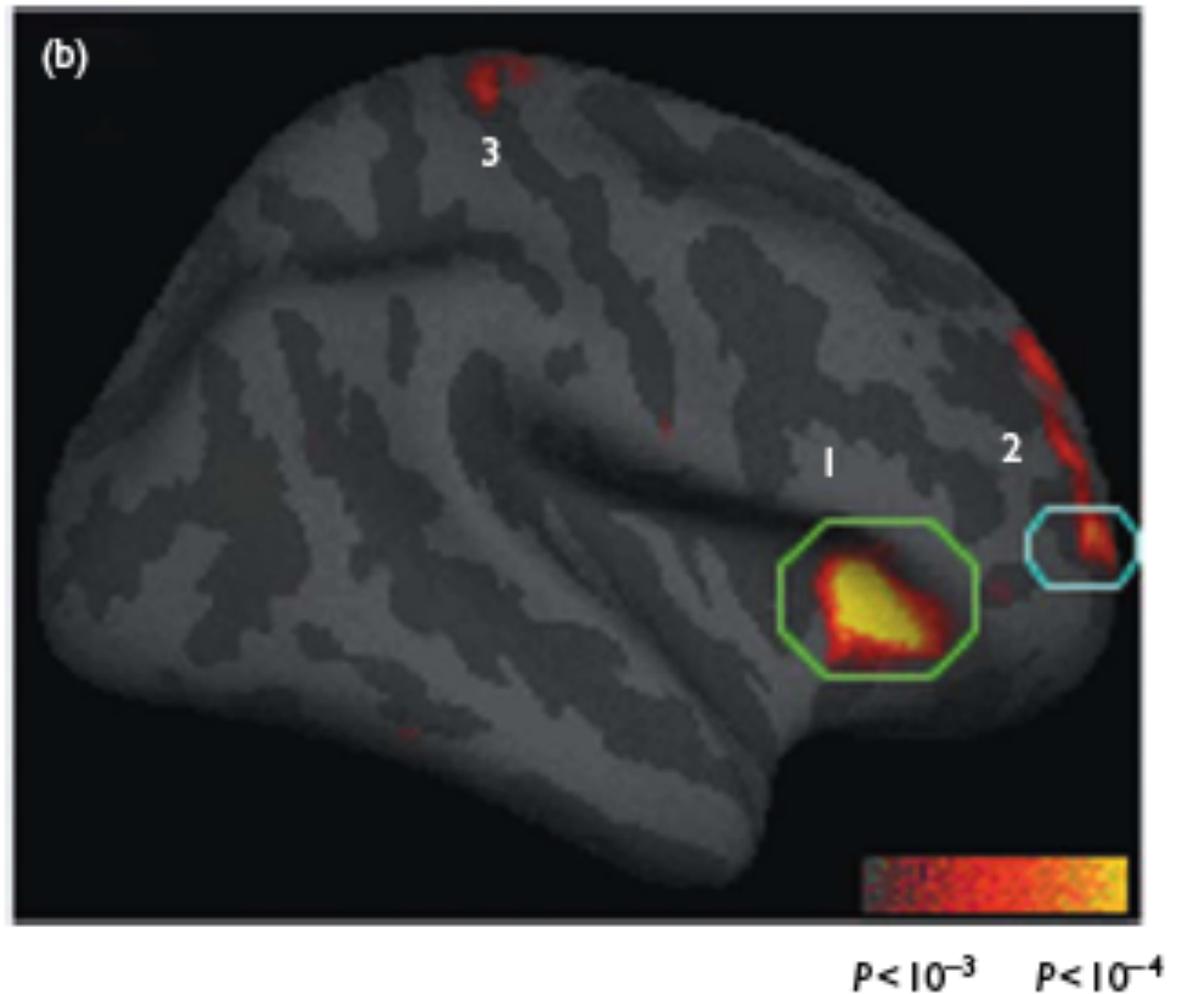
**Repeated mental activity entails
repeated neural activity.**

**Repeated neural activity
builds neural structure.**

Mind Changes Brain in Lasting Ways

- What flows through the mind sculpts your brain. Immaterial experience leaves material traces behind.
- Increased blood/nutrient flow to active regions
- Altered epigenetics (gene expression)
- “Neurons that fire together wire together.”
 - Increasing excitability of active neurons
 - Strengthening existing synapses
 - Building new synapses; thickening cortex
 - Neuronal “pruning” - “use it or lose it”

Lazar, et al. 2005.
Meditation
experience is
associated
with increased
cortical thickness.
Neuroreport, 16,
1893-1897.



Honoring Experience

One's experience *matters*.

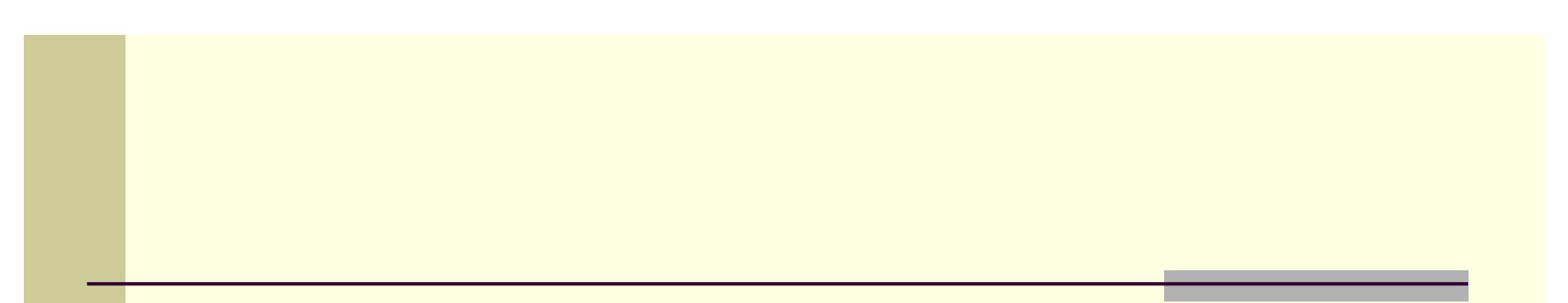
**Both for how it feels in the moment
and for the lasting residues it leaves behind,
woven into the fabric of a person's brain and being.**

Fact #3

You can use your mind
to change your brain
to change your mind for the better.

This is self-directed neuroplasticity.

How to do this, in skillful ways?



The Power of Mindfulness

Mindful Attention

- Attention is like a spotlight, lighting what it rests upon.
- Because neuroplasticity is heightened for what's in the field of focused awareness, attention is also like a vacuum cleaner, pulling its contents into the brain.
- Directing attention skillfully is therefore a fundamental way to shape the brain - and one's life over time.
- One of the many benefits of mindfulness training is the development of skillful attention.

*The education of attention
would be the education par excellence.*

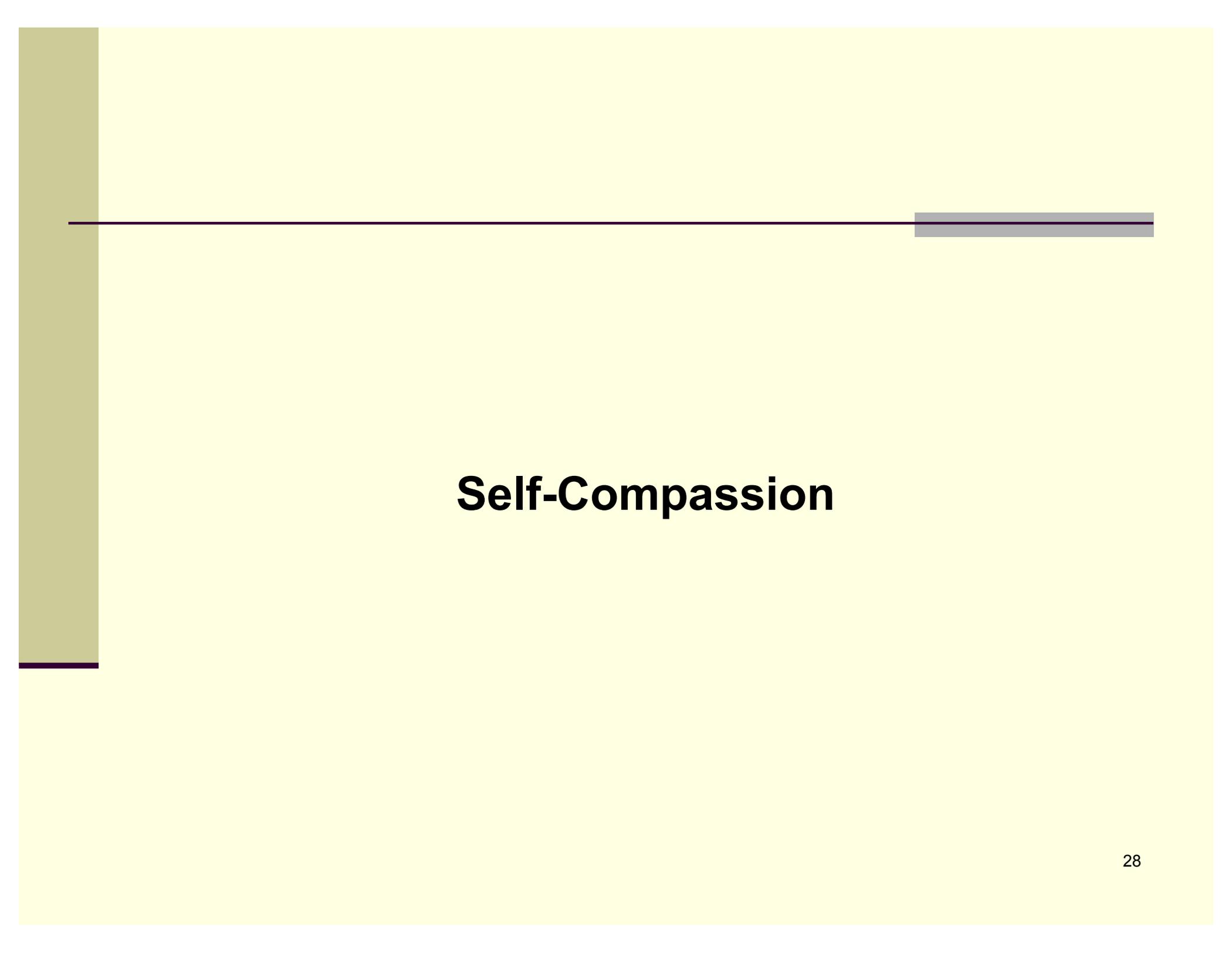
William James

Basics of Meditation

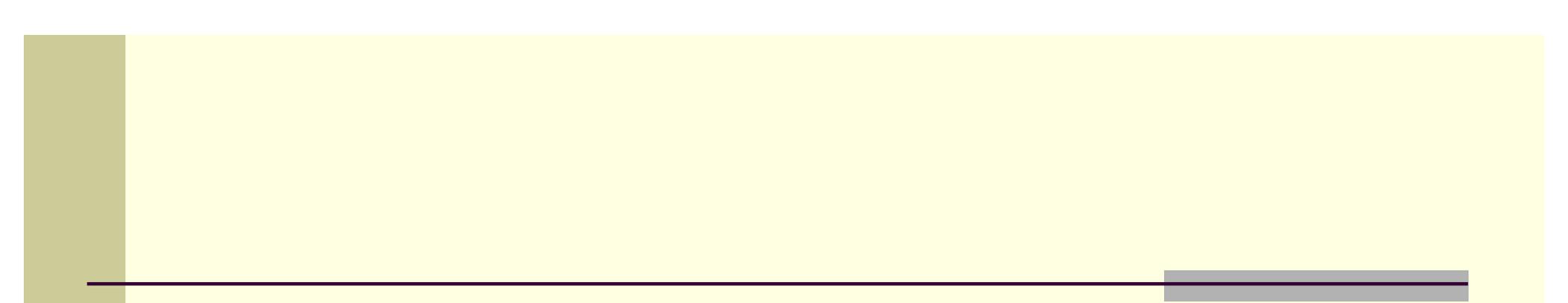
- Relax; find a posture that is comfortable and alert
- Simple good will toward yourself
- Awareness of your body
- Focus on something to steady your attention
- Accepting whatever passes through awareness, not resisting it or chasing it
- Gently settling into peaceful well-being

Neural Basis of Mindfulness Factors

- **Setting an intention** - “top-down” frontal, “bottom-up” limbic
- **Relaxing the body** - parasympathetic nervous system
- **Feeling cared about** - social engagement system
- **Feeling safer** - inhibits amygdala/ hippocampus alarms
- **Encouraging positive emotion** - dopamine, norepinephrine
- **Absorbing the benefits** - positive implicit memories



Self-Compassion



*The root of compassion is
compassion for oneself.*

Pema Chodron

Wishing Yourself Well

- Compassion is the wish that a being not suffer, combined with sympathetic concern. Self-compassion simply applies that to oneself. It is not self-pity, complaining, or wallowing in pain.
- Studies show that self-compassion buffers stress and increases resilience and self-worth.
- But self-compassion is hard for many people, due to feelings of unworthiness, self-criticism, or “internalized oppression.” To encourage the neural substrates of self-compassion:
 - Get the sense of being cared about by someone else.
 - Bring to mind someone you naturally feel compassion for
 - Sink into the experience of compassion in your body
 - Then shift the compassion to yourself, perhaps with phrases like: “May I not suffer. May the pain of this moment pass.”

*The good life, as I conceive it, is a happy life.
I do not mean that if you are good you will be happy;
I mean that if you are happy you will be good.*

Bertrand Russell

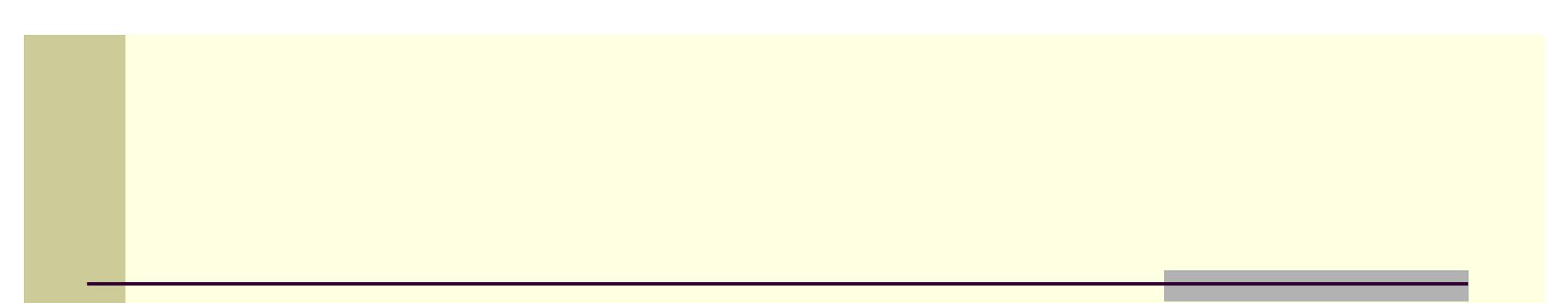
*If one going down into a river,
swollen and swiftly flowing,
is carried away by the current --
how can one help others across?*

The Buddha

“Anthem”

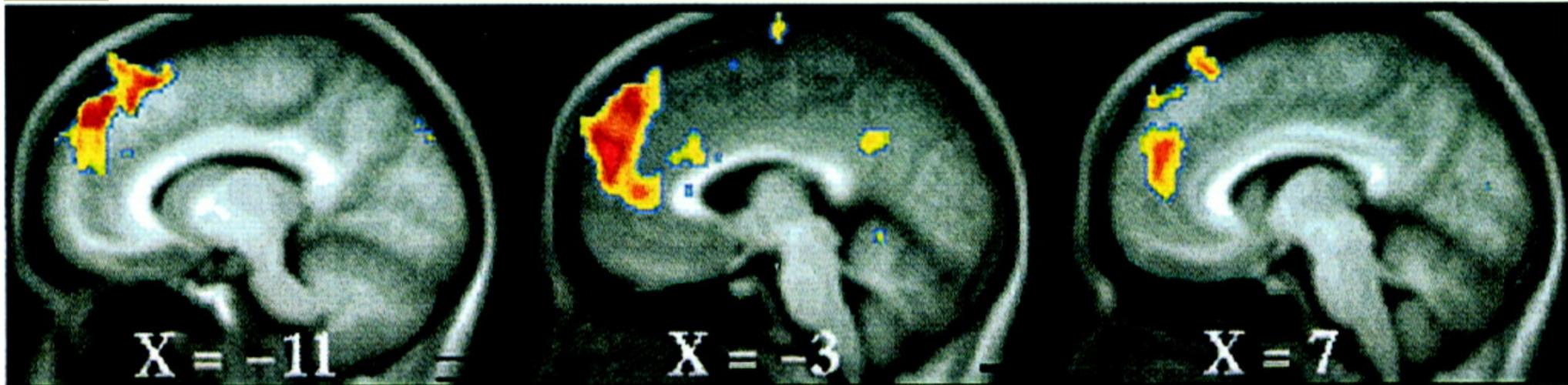
*Ring the bells that still can ring
Forget your perfect offering
There is a crack in everything
That's how the light gets in
That's how the light gets in*

Leonard Cohen



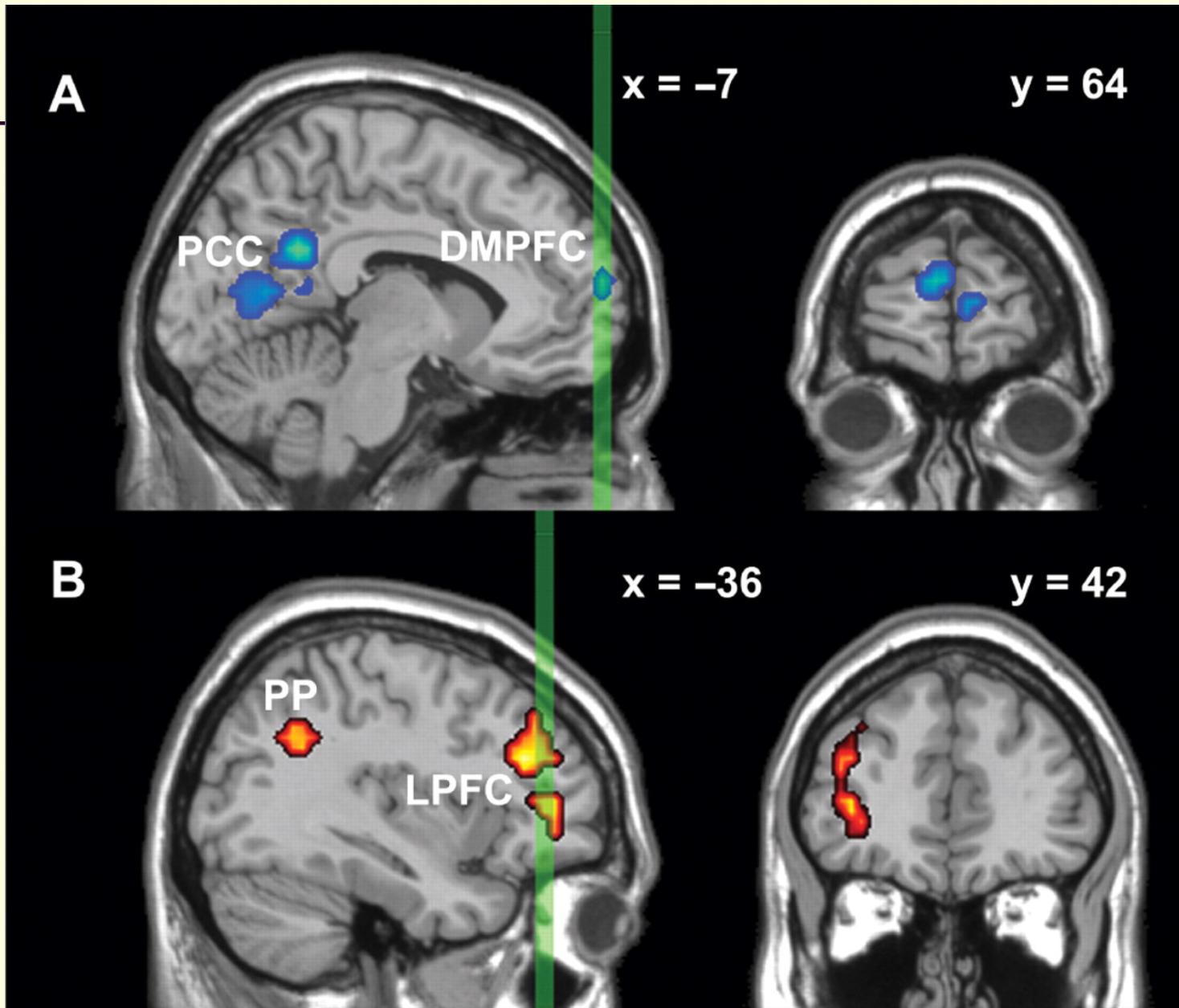
Networks of Spacious Awareness

Increased Medial PFC Activation Related to Self-Referencing Thought



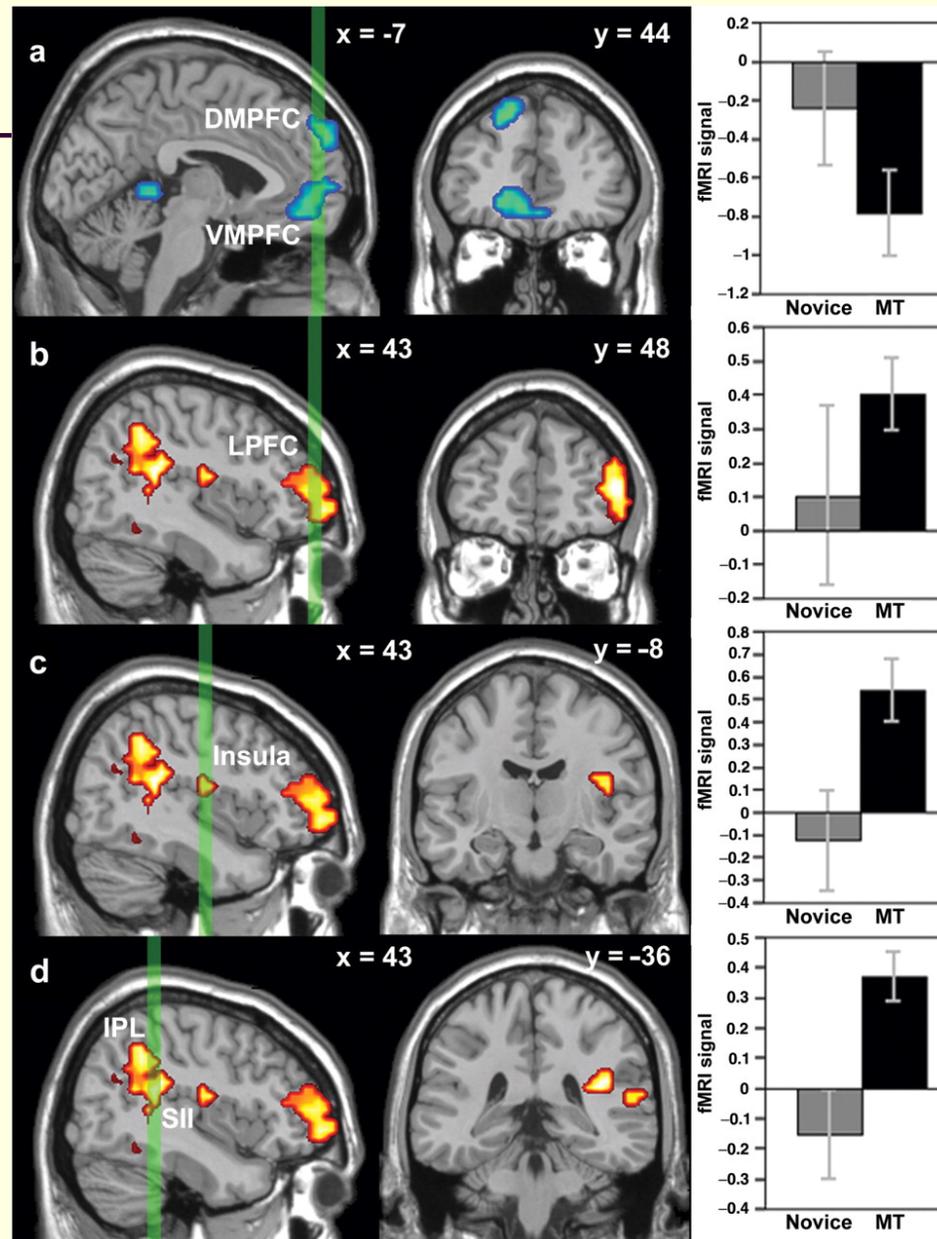
Gusnard D. A., et.al. 2001. *PNAS*, 98:4259-4264

Self-Focused (blue) and Open Awareness (red) Conditions (in the novice, pre MT group)



Farb, et al. 2007. *Social Cognitive Affective Neuroscience*, 2:313-322

Self-Focused (blue) and Open Awareness (red) Conditions (following 8 weeks of MT)



Ways to Activate Lateral Networks

- Relax.
- Focus on bare sensations and perceptions.
- Sense the body as a whole.
- Take a panoramic, “bird’s-eye” view.
- Engage “don’t-know mind”; release judgments.
- Don’t try to connect mental contents together.
- Let experience flow, staying here now.
- Relax the sense of “I, me, and mine.”

Whole Body Awareness

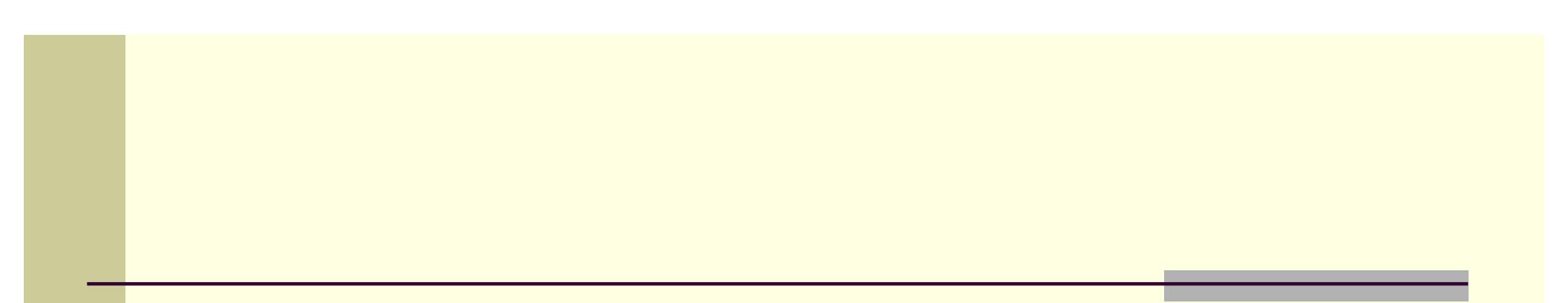
- Involves insula and middle parietal lobes, which integrate sensory maps of the body, plus right hemisphere, for holistic (gestalt) perception
- Practice
 - Sense the breath in one area (e.g., chest, upper lip)
 - Sense the breath as a whole: one gestalt, percept
 - Sense the body as a whole, a whole body breathing
 - Sense experience as a whole: sensations, sounds, thoughts . . . all arising together as one unified thing
- This sense of the whole may be present for a second or two, then crumble; just open up to it again.

Panoramic Awareness

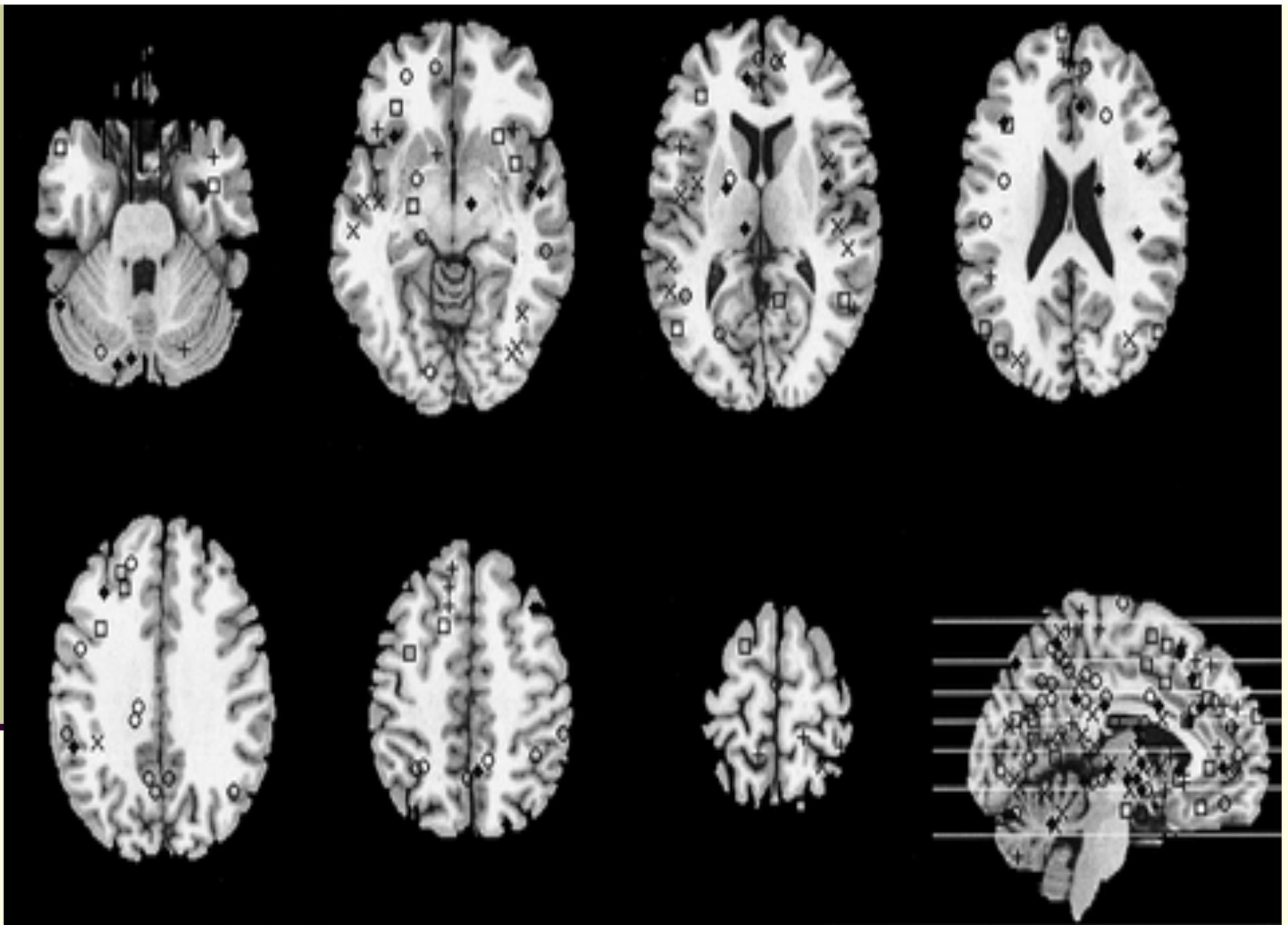
- Recall a bird's-eye view (e.g., mountain, airplane).
- Be aware of sounds coming and going in an open space of awareness, without any edges: boundless.
- Open to other contents of mind, coming and going like clouds moving across the sky.
- Pleasant or unpleasant, no matter: just more clouds
- No cloud ever harms or taints the sky.

*Trust in awareness, in being awake,
rather than in transient and unstable conditions.*

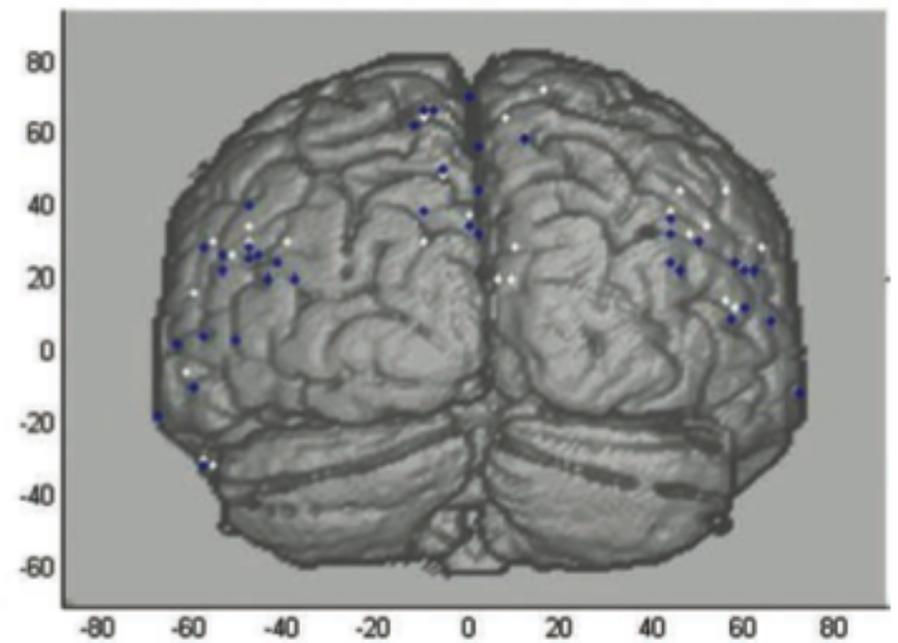
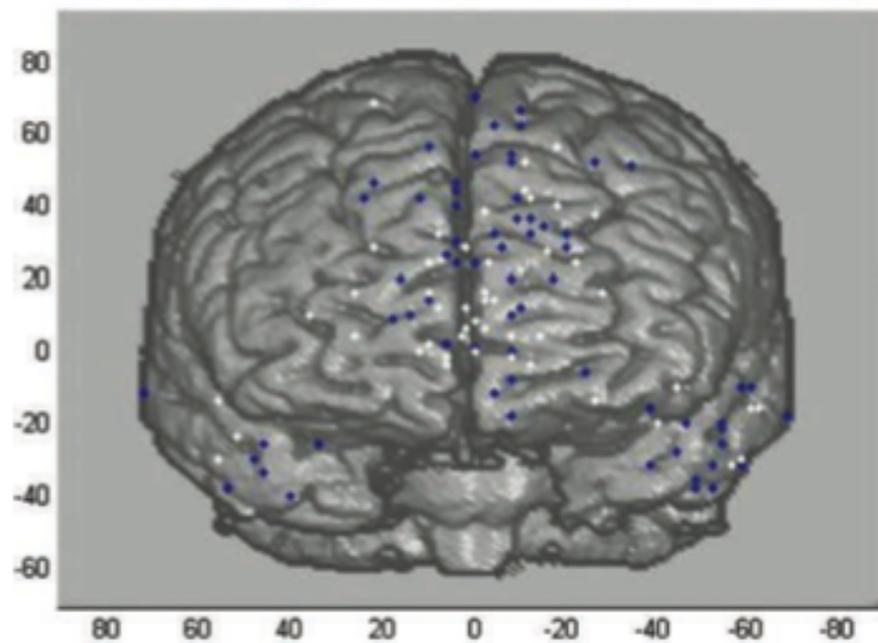
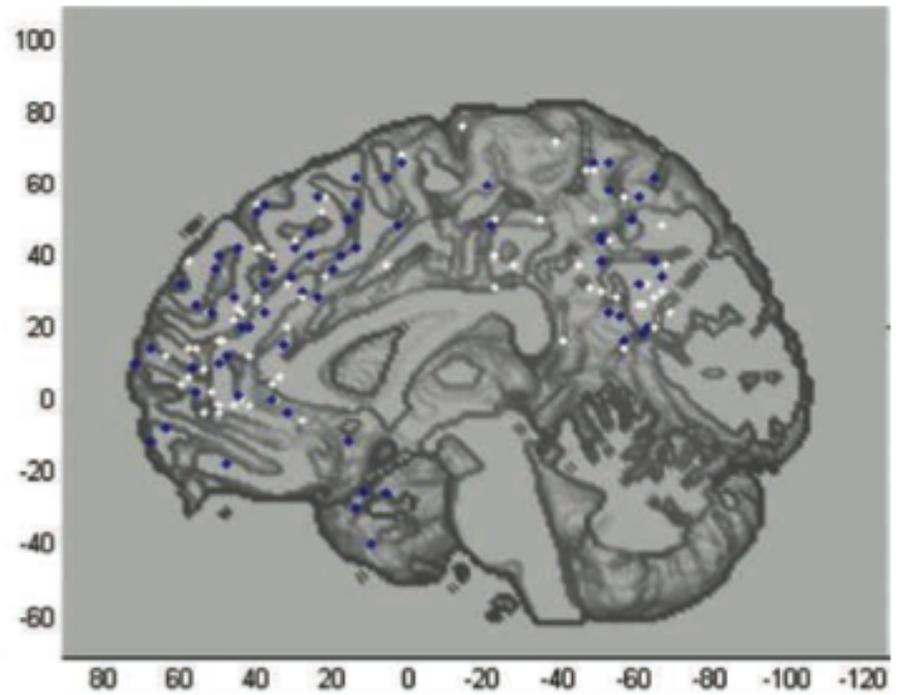
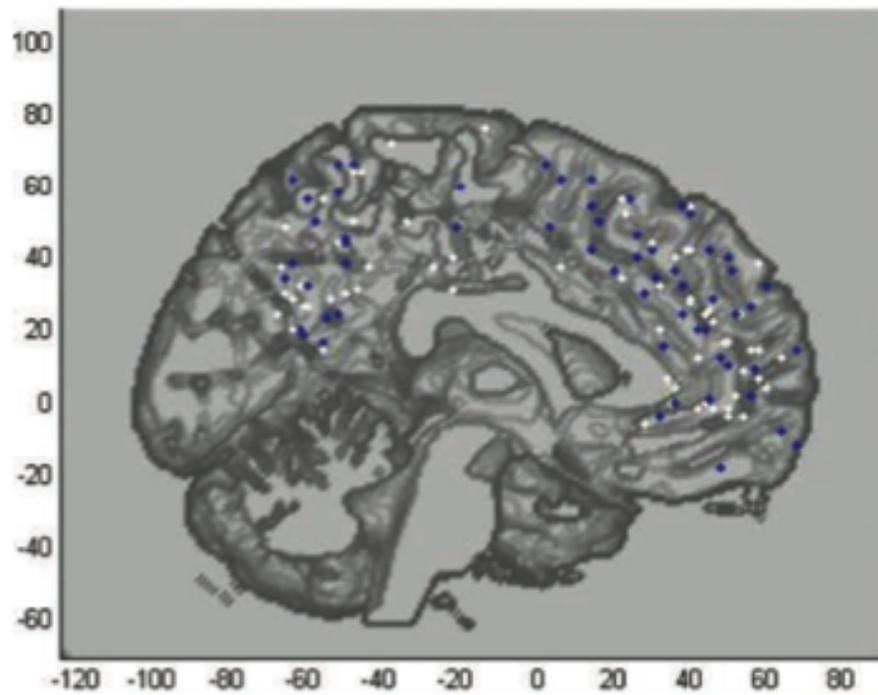
Ajahn Sumedho



Taking Life Less Personally



Is self special? Gillihan, et al., *Psychological Bulletin*, 2005



**What is self-specific? Legrand and Ruby, *Psychological Review*, 2009. ⁴⁴
[White = self; blue = other]**

“Bahiya, you should train yourself thus.”

In reference to the seen, there will be only the seen. To the heard, only the heard. To the sensed, only the sensed. To the cognized, only the cognized.

When for you there will be only the seen in reference to the seen, only the heard in the heard, only the sensed in the sensed, only the cognized in the cognized, then, Bahiya, there's no you in that.

When there's no you in that, there's no you there. When there's no you there, you are neither here nor yonder nor between the two.

This, just this, is the end of all suffering.

Penetrative insight

joined with calm abiding

utterly eradicates

afflicted states.

Shantideva

Great Books

See www.RickHanson.net for other great books.

- Austin, J. 2009. *Selfless Insight*. MIT Press.
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Key Papers - 1

See www.RickHanson.net for other scientific papers.

- Atmanspacher, H. & Graben, P. 2007. Contextual emergence of mental states from neurodynamics. *Chaos & Complexity Letters*, 2:151-168.
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Key Papers - 2

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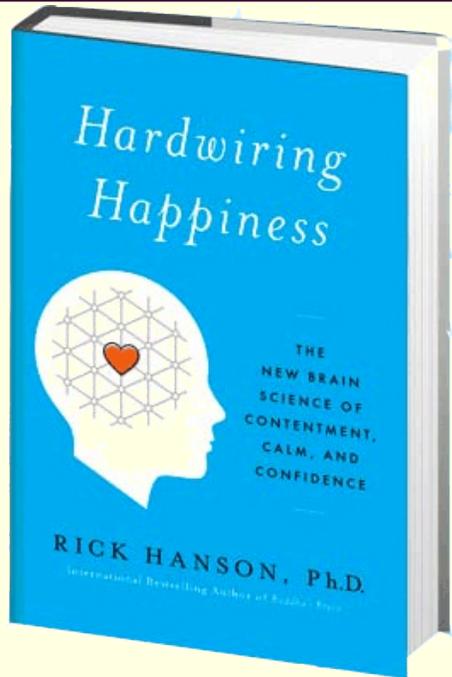
Key Papers - 3

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Key Papers - 4

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Where to Find Rick Hanson Online



Hardwiring Happiness: The New Brain Science of Contentment, Calm, and Confidence

www.rickhanson.net/hardwiringhappiness

Personal website: www.rickhanson.net

Wellspring Institute: www.wisebrain.org



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